



US009636270B2

(12) **United States Patent**
Miyazawa

(10) **Patent No.:** **US 9,636,270 B2**
(45) **Date of Patent:** **May 2, 2017**

(54) **FINGER ASSIST DEVICE**

(56) **References Cited**

(71) Applicant: **Seiko Epson Corporation**, Tokyo (JP)

U.S. PATENT DOCUMENTS

(72) Inventor: **Osamu Miyazawa**, Shimosuwa-machi (JP)

2004/0212278 A1 10/2004 Miyazawa
2006/0094989 A1* 5/2006 Scott A61F 2/54
601/5

(73) Assignee: **Seiko Epson Corporation** (JP)

2007/0228875 A1 10/2007 Miyazawa
2009/0160291 A1 6/2009 Miyazawa
2010/0041521 A1* 2/2010 Ingvast A61H 1/0288
482/49

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 191 days.

(Continued)

(21) Appl. No.: **14/202,686**

FOREIGN PATENT DOCUMENTS

(22) Filed: **Mar. 10, 2014**

JP 11-309184 A 11/1999
JP 2002-345861 A 12/2002

(65) **Prior Publication Data**

US 2014/0288664 A1 Sep. 25, 2014

(Continued)

(30) **Foreign Application Priority Data**

Mar. 25, 2013 (JP) 2013-061543

Primary Examiner — Justine Yu

Assistant Examiner — Kathryn Lyddane

(74) *Attorney, Agent, or Firm* — Harness, Dickey & Pierce, P.L.C.

(51) **Int. Cl.**

A61H 1/02 (2006.01)

A61F 2/58 (2006.01)

A61F 2/68 (2006.01)

A61F 5/01 (2006.01)

(52) **U.S. Cl.**

CPC **A61H 1/0288** (2013.01); **A61F 2/586** (2013.01); **A61F 2/68** (2013.01); **A61F 5/013** (2013.01); **A61H 2201/1635** (2013.01); **A61H 2201/5061** (2013.01); **A61H 2205/065** (2013.01); **A61H 2205/067** (2013.01)

(58) **Field of Classification Search**

CPC A61H 1/0288; A61H 1/0285; A61H 2201/1635; A61H 2201/5061; A61H 2205/067; A61H 2205/065; A61F 2/586

See application file for complete search history.

(57)

ABSTRACT

A finger assist device is formed by rotatably connecting a plurality of units in a finger bending direction and a finger spreading direction. The unit is worn on a finger by nipping the finger with a nipping part from the pad and the back of the finger, and a drive force is controlled by detecting a first contact force between the finger pad and the nipping part and a second contact force between the finger back and the nipping part. Since the intention of the wearer of the finger assist device appears in the first contact force and the second contact force, the drive force of the finger assist device is appropriately controlled according to the wearer's intention, and thereby, bending and spreading of the finger may be appropriately assisted.

17 Claims, 10 Drawing Sheets

